CUTTINGSVILLE BRIDGE
spanning Mill River on Vermont Route 103,
north of intersection with Town Highway 2
Shrewsbury
Rutland County
Vermont

HAER No. VT-18

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Mid-Atlantic Region
Department of the Interior
Philadelphia, Pennsylvania 19106

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Location: Spanning the Mill River on Vermont Route 103 just north of the intersection of Vermont Route 103 and Town Highway 2
Town of Shrewsbury
Rutland County
Vermont

USGS Wallingford Quadrangle, Universal Transverse Mercator Coordinates 18.671095 . 4817000

Date of Construction: 1928

Engineer: American Bridge Company

Present Owner: State of Vermont

Present Use: Vehicular Bridge

Significance: The bridge is significant as a representative example of the bridges built following the flood of 1927, in which over 1250 of Vermont's bridges were destroyed. The flood was a major episode in Vermont's 20th-century history. The resulting engineering effort included the extensive use of standardized design and economical construction by which the State was able to rebuild a large number of bridges very quickly. The American Bridge Company which dominated the Vermont bridge market prior to the flood, retained its dominance by being the more productive of the two major providers of flood-era bridges. This bridge is eligible for inclusion on the National Regiseter of Historic Places.

Project Information: This documentation was undertaken in March and April, 1990, in accordance with a Memorandum of Agreement signed by the Federal Highway Administration, the Vermont State Historic Preservation Office, and the Advisory Council on Historic Preservation (ACHP). The Memorandum of Agreement has been accepted by the ACHP as a mitigative measure prior to replacement of the bridge in 1991.

Prepared by Alison B. Church, Project Engineer, Location & Environmental Studies Section, Vermont Agency of Transportation, Montpelier, Vermont.

1. Site Features and Historical Background

This bridge is located over the Mill River in the Village of Cuttingsville near the southern boundary of the Town of Shrewsbury, approximately 8 miles below the river's headwaters along the eastern side of the Green Mountain Range on Ludlow Mountain and Wilder Mountain. The Mill River flows north and west until its confluence with the Otter Creek which continues its north and west flow direction until it ends in Kingsland Bay (in the Town of Ferrisburg) near the southern limit of Lake Champlain. Lake Champlain drains north via the St. Lawrence River in Quebec, which in turn flows east to the Gulf of St. Lawrence and the Atlantic Ocean.

Shrewsbury evolved as a result of its location on an extensively used travel artery. Prior to European colonization, native Americans established various routes of travel between Lake Champlain on the Western side of the state and the Connecticut River on the eastern side. One such east-west route of travel passed through what would be the Town of Shrewsbury. It originated at the mouth of the Otter Creek at Lake Champlain, transversed that river's valley, crossed the Creen Mountain Range, then followed the valley formed by the Black River until its confluence with the Connecticut River (in what would be the Town of Springfield, VT). (1)

The early narrow trails, parallel and close to the streams, were trodden mostly by mocassins and snowshoes. Later they were deepened and became more firmly defined upon introduction of the European settlers' heavier footwear. As time passed, the main trail also widened accommodating dog-drawn sleds, riding horses and eventually ox-drawn sleds and carts. (2)

In 1760, Vermont's first military road, the Crown Point Road, was constructed closely paralleling the ancient well-worn trail, diverging only at the western (Lake Champlain) terminus. After having seen the land as they traversed the military road as soldiers during the French and Indian War and later the Revolutionary War, many men returned to those areas they liked establishing some of the earliest homesteads in the region. The Military Road, in passing directly through what was to be Shrewsbury, provided a route for settlement. Between thia Military Road and the Creen Mountain Turnpike which was chartered in 1799, overlaying the old Indian Path in this stretch, the corridor was heavily travelled. The Town of Shrewsbury boasted two villages: Shrewsbury Center by the Military Road and Cuttingsville by the Creen Mountain Turnpike. Neither village is incorporated; therefore both are governed by the Town of Shrewsbury. Reference to these villages is purely for geographic purposes. The first meeting house waa erected in 1805 at Shrewsbury Center and became the social focal point for the developing farm community. Vermont Route 103, of which the Cuttingsville Bridge is a component, is a modern paved and further widened section of the Creen Mountain Turnpike. (3)

The Town that originated as a point along a military road soon

evolved into a significant mill and farming community. By the mid 1800's, Shrewsbury's dairy industry was the most productive in Rutland County. Shrewsbury Center became a dairy processing center while Cuttingsville, was primarily a mill village. Upon the 1849 construction of the Rutland and Burlington Railroad alongside the Green Mountain Turnpike, Cuttingsville became the shipping and commercial center. With the invention of the refrigerated railroad car in 1851 and the acknowledged pre-eminence of Cuttingsville as the local depot and commercial center, Shrewsbury was able to expand its market for dairy products to points in southern New England. (4)

Cuttingsville retained its status as the shipping and commercial center until the turn of the 20th Century after which time modern automotive transportation systems decentralized "shipping centers" founded on the railroad industry. (5)

2. Bridge Description

The Cuttingsville bridge is a single span steel Pratt pony truss. The 102'-10" span is composed of 5) 24'-2" panels. Each panel is detailed as follows:

The top chords which resemble box girders with latticed undersides are built up sections composed of two channels aligned back to back with a 20" separation. A 20"x3/8" solid steel plate is riveted to the channels. The bottom chords are comprised of two channels with top and bottom stay plates at 4' intervals. I-beam verticals and diagonals connect the top and bottom chords. The verticals carry the compressive forces while the diagonals carry the tensile forces. (6)

The floor system is composed of I section floor beams and stringers, with angle iron cross bracing in each floor beam bay. The bridge surface is a concrete slab. The bridge rail is a built up section consisting of angles and channels bolted to the trusses. Builder's plates are present on the inclined end panels of the truss. The abutments are concrete. (7)

Since its construction in 1928, the bridge has been repaired. Though dates of repair are not known, there is evidence of work done. In addition to patching concrete where needed in the deck, sidewalks, and abutments, sections of the steel bridge railing have been replaced. Several of the steel gussets that connect the cross bracing to the lower chord of the truss have been replaced. The bridge rail, which is integral with the steel truss, had been heavily damaged by vehicles attempting to maneuver the poor alignment. As mentioned in the section on Design and Technology, this bridge and all others of standard design were typically subject to poor alignment in that crossings had to be perpendicular to the river. Approaches consisting of sharp curves characterize crossings in which the bridges were standardized. (8)

The bridge is in structurally poor condition. Many of the cross bracings have lost their structural integrity; some by having been hit and damaged by debris and highwater, others by heavy rusting and consequent section loss, especially at connections with the lower chord of the truss. Both the floor beams and the stringers have experienced heavy rust scale and some section loss. Both abutments have spalling with some steel bars exposed and the bearings have heavy rust scale. (9)

Additionally, the alignment is very poor with a sharp curve onto the bridge and town highway intersection on that curve immediately east of the bridge. The existing bridge is also extremely narrow. (10)

3. Construction

In early November 1927, three days worth of heavy rain inundated the State, resulting in the Flood of 1927. Any particular region in the state is subject to serious flooding periodically. The Flood of 1927 was a statewide event and was the most destructive flood in recorded history. The term flood era will be used to refer to this statewide flood exclusively.

The bridge at this site on Vermont Route 103, like most bridges on primary highways at the time, was an iron structure. lt was a queenpost rod tensioned slung carrier structure with a wooden deck and sidewalk. (11)

The flood damage in Shrewsbury amounted to $229,000. On November 30, 1927, a special Legislative session was called to order by Governor John E. Weeks. At this session, the State assumed the responsibility for all road and bridge construction. Approximately $8 million of an $8.5 million bond issue waa appropriated for highway and bridge construction to be supervised by the State Highway Board. To assist the State, the United States Congress appropriated $2.6 million. To receive the federal aid, the State had to delay repair work until passage of the aid bill in late May of 1928. (12)

With over 1,250 bridges totally destroyed or severely damaged by the flood, the State required mass production and installation of replacement bridges. (13)

The State's bridge engineer, A. D. Bishop, made the decision to use standardized designs to facilitate mass production in order to deal with the given time constraints imposed by the flood. "It was.. realized that it would be impossible during the winter, so as to have them available in the early spring, to draw up plans covering all the bridges to be constructed this year. For this reason, it was decided to standardize all the work possible." Warren pony trusses (intended for spans less than 100 ft.) and Pratt through trusses (intended for spans between 100 ft. and 160 ft.) were the

most common configurations of standardized design. The Pratt pony truss was a configuration that resulted when a span length fell at the lower end of the Pratt through truss range. Therefore, although a variation from the most common configurations, the Pratt pony truss was still of standardized design.(14)

The American Bridge Company was the more prolific of two fabrication companies that supplied the majority of Vermont's flood era bridges. In addition to fabricating the most flood era bridges, the American Bridge Company loaned Vermont's Highway Commission a structural engineer to head the team designing steel structures. This personnel loan was particularly beneficial in that it provided the Highway Commission with unprecedented access to state-of-the-art engineering, particularly in terms of advice on material strength and availability. American Bridge Company's parent firm, United States Steel Company, was unquestionably the foremost source of rolled structural steel. (15)

The American Bridge Company was a classic example of a monopolistic big business at the turn of the century. After the business floundered for a year as an independent entity, J.P. Morgan incorporated the company in 1900. The United States Steel Company bought most of the American Bridge Stock, operating it as a subsidiary. Within the year, American Bridge Company purchased 24 companies, thereby controlling a full one half of the national fabrication marketing at the time. While decommissioning the older plants of the acquired firms, American Bridge Company opened a new fabrication plant in Pennsylvania that was three times larger than any other plant. By bidding on any job in any state requiring the use of steel bridges, American Bridge Company asserted its complete market dominance. Even today the company is the largest structural steel fabricator. (16)

4. Design and Technology

For the majority of steel bridges constructed prior to the flood era, the structure consisted of built up members, characterized by plates, channels and angles riveted together. Though this bulkiness resulted in very strong members, the process required extensive in-shop assembly. The standardized bridges built after the flood featured built-up members only for the top and bottom chords, with rolled I-beams for the vertical and diagonal members to connect the top and bottom chords. The use of I-beams for those members minimized the time required for assembly, thereby expediting the process of replacing the bridges. (17)

The only limiting restraint imposed by the use of standardized design was in alignment. Structures of this type required a crossing nearly perpendicular to the feature crossed. Restrictions on the skew angle resulted in roadway approaches with very tight curves,

a less than desirable horizontal alignment. (18)

Standardization, as exemplified by the Shrewsbury bridge, was initiated in the 1910's but was not used on a widespread basis. Therefore, the significance of this bridge, as well as other standardized bridges of the era is that through the large scale use of these bridges after the flood, Vermont helped set the precedent in the bridge construction industry of utilizing rolled beams in trusses with standardized chords. (19)

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FOOTNOTES

1. William J. Wilgus, The Role of Transportation in the Development of Vermont (Montpelier, VT: Vermont Historical Society, 1945) p. 45.

2. Wilgus, p. 45.

3. Wilgus, pp. 45-6.

4. Curtis B. Johnson and Elsa Gilbertson, Ed., The Historic Architecture of Rutland County (Montpelier, VT: The Vermont Division for Historic Preservation, 1988) p. 394.

5. Johnson and Gilbertson, p. 395.

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7. "Historic Sites and Structures Survey".

8. "Dictaphone Bridge Inspection Report Shrewsbury BR 50" (on file in the Structures Division of Vermont, Agency of Transportation, Montpelier, VT, October 2, 1989)., p.33.

9. "Bridge Report" p. 33.

10. "Bridge Report", p. 33.

11. Dawn Hance, Shrewsbury Vermont - Our Town As It Was (Rutland, Vt.: Academy Books.) (photo) p. 26 (photo) p. 189.

12. W. Arthur Simpson, "Solving the Flood Highway Problem" The Vermont Review 2 (1927): pp. 133-4.

13. Matthew Ross and Bruce Clouette, "Vermont Historic Bridge Survey" Final Report and Preservation Plan on File at Division for Historic Preservation, Agency of Community and Development Affairs, State of Vermont, Montpelier, VT, 1985) p.II-21.

14. Ross and Clouette, p. II-22.

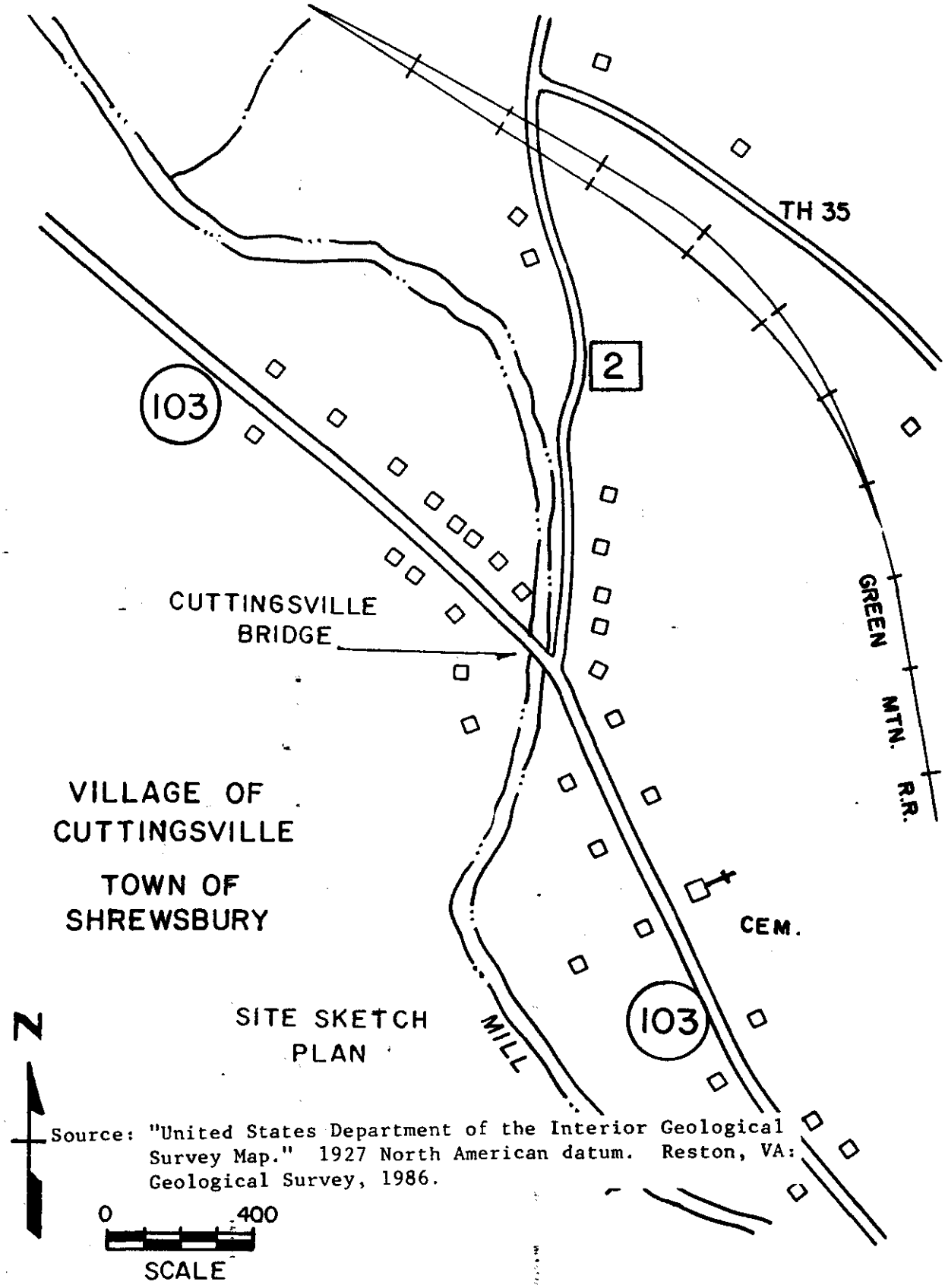
15. Ross and Clouette, p. II-21.

16. Ross and Clouette, pp. Appendix 6.2-3.

17. Ross and Clouette, p. II-23.

18. Ross and Clouette, p. II-23.

19. Ross and Clouette, p. II-24.



Source: "United States Department of the Interior Geological Survey Map." 1927 North American datum. Reston, VA: Geological Survey, 1986.